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| 09/504,660      | 02/14/2000  | William E. Hoke      | 07206-047001        | 8160             |

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EXAMINER

KANG, DONGHEE

ART UNIT PAPER NUMBER

2811

DATE MAILED: 05/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/504,660

Applicant(s)

HOKE ET AL.

Examiner

Donghee Kang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 18-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 18-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Acknowledgment*

1. Applicant's Amendment and Response to Paper No.12 have been entered and made of Record. Claims 16-17 have been cancelled. Thus claims 1-8 and 18-34 are pending in this Office Action.

### ***Claim Rejections - 35 USC § 102 or 35 USC § 103***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims **1-2 & 5-7** are rejected under 35 U.S.C. 102(e) as being anticipated by Onda (US 6,194,747 B1) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Onda.

Onda discloses a semiconductor structure comprising (Fig.14):

a Schottky layer (206), wherein the schottky layer is made of InAlAs; a contact layer (207) disposed above the Schottky layer, wherein the contact layer comprises less than about ten percent Aluminum;

wherein the contact layer provides an opening through the contact layer exposing a region of a top surface of the Schottky layer, the region having a first width; and

wherein the region of the top surface of the Schottky layer provides a recess of a second width smaller than the first width and the recess of the second width is adapted to receive a gate electrode. *See also Col.2, lines 37-56.*

Onda does not explicitly teach the schottky layer adapted to be etched at a first etch rate by an etchant and the contact layer adapted to be etched by the etchant at a second etch rate that is substantially faster than the first etch rate.

These limitations recite process steps to from the structure claimed in 1. The resultant structure of the process steps in claims are anticipated by Onda. The product-by-process claims are given no patentable weight. A product-by-process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed.Cir.1983); and particularly *In re Thrope*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability in a "product-by-process" claim, and not the patentability of the process step, which must be determined in a "product-by-process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims **3-4, 8, 18-31, & 34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Onda (US 6,194,747 B1).

Regarding claims **3-4 & 8**, Onda does not explicitly teach an Aluminum concentration in the schottky layer. The selection of concentration of various layers in device is an obvious design choice, therefore held within ordinary skills in the art, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

Regarding claims **18, 23, & 31**, Onda discloses a transistor comprising (Fig.1) a semi-insulating indium phosphide substrate (101) having a lattice constant; a channel layer of InGaAs (103) disposed over the substrate, the channel layer having a lattice constant different from the lattice constant of the substrate; a Schottky layer of InAlAs (106) disposed over the channel layer, the schottky layer having a lattice constant different from the lattice constant of the substrate; a first cap layer (107) disposed over the schottky layer; a contact layer (108) disposed over the first cap layer, the contact layer having a first recess therein, such first recess having a bottom surface terminating in a top surface of the first cap layer; a second recess having sidewalls in the first cap layer and the schottky layer, such second recess having a bottom surface terminating in the schottky layer; a source electrode (109b) in ohmic contact with the contact layer; a drain electrode (109c) in ohmic contact with the contact layer; and a gate electrode (109a) in schottky contact with the schottky layer.

Onda does not clearly teach the first cap layer is a resistive layer. However it is acknowledged that a first cap layer would very well meet the recited term "resistive layer" and are precisely the same material and perform the same function as applicant's claimed "resistive layer". Tanimoto et al also teach in Fig.2 and *Col.1, lines 41-51* InAlAs layer 28, which is identical to the first cap layer 107 in Onda's device, is resistive layer. Hence, claimed structure is taken to be in the least obvious over Onda.

Regarding claims **19-21**, Although Onda does not teach the lattice constant of the schottky layer is smaller than the lattice constant of the substrate and the lattice constant of the channel layer is larger than the lattice constant of the substrate, this feature is inherent in Onda's device because the structure and materials of Onda's device are identical to the claimed structure.

Regarding claim **22**, Onda does not teach the concentration of Indium in the schottky and channel layer. However, the selection of concentration of various layers in device is an obvious design choice, therefore held within ordinary skills in the art, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

Regarding claims **24-26 & 28-29**, Onda teaches the schottky layer comprises InAlAs and the channel layer comprises InGaAs but does not teach the concentration of In, Al, and Ga. However, the selection of concentration of various layers in device is an obvious design choice, therefore held within ordinary skills in the art, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering

the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

Regarding claims **27 & 30**, Onda discloses all claimed invention, as applied to claim 18 above, except that the indium concentration of the channel and schottky layer. However, the selection of concentration of various layers in device is an obvious design choice, therefore held within ordinary skills in the art, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

Regarding claim **34**, Onda teaches the first cap layer comprises InAlAs and the contact layer comprises InGaAs but does not teach specific ratio between In and Al or Ga. However, the selection of concentration of various layers in device is an obvious design choice, therefore held within ordinary skills in the art, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

6. Claims **32-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Onda as applied to claim 31 above, and further in view of Hur et al. ("Ultralinear Doubled Pulse doped AlInAs/GaInAs/InP HEMTs", Electronic Lett., IEE Stevenage, GB, Vol.32, No.16, August 1, 1996, pages 1516-1518).

Regarding claim **32**, Onda does not teach the transistor further comprising a first doped layer and second doped layer. However, Hur et al teaches in Fig.1 a first Si pulse doped layer and a second Si pulse layer. Thus, it would have been obvious <sup>to</sup> one having

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ordinary skill in the art at the time the invention was made to incorporate the teaching of Hur into the Onda's device, since the pulse doping profiles have been optimized to yield the broad constant region of transconductance with respect to gate-to-source bias.

Regarding claim **33**, neither Onda nor Hur teaches a silicon doping concentration of the first and second doped layers. However, the selection of concentration of various layers in device is an obvious design choice, therefore held within ordinary skills in the art, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

### ***Response to Arguments***

7. Applicant's arguments filed February 11, 2002 have been fully considered but they are not persuasive.

Applicant submitted a declaration under 37 CFR 1.131 to remove Onda as a reference.

However, the declaration under 37 CFR 1.132 filed February 11, 2002 is insufficient to overcome the rejection of claims 1-8 & 18-34 based upon 35 USC 102 or USC 103 as set forth in the last Office action because: disclosure document entitled "High Breakdown Voltage, Strain Compensated AlInAs/GaInAs/InP HEMTs" is not commensurate in scope with the claims.

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.



***C nclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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Donghee Kang, Ph.D.  
April 25, 2002

Steven Loko  
Patent Examiner  
